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PRIMITIVE FIRE-KINDLING

By ERNEST INGERSOLL

Illustrated from apparatus in the National Museum.

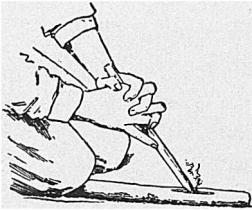


FIG. 2. THE PLOW: AUSTRALIA

THE folk-lore of all primitive peoples contains fanciful stories of the origin of fire—the family fire—none of which are more pleasing than some recited by our North American Indians; but it is plain that few of the great customs of human life are so easily accounted for. Fire is a part of nature. It

comes with every outflow of volcanic lava, follows the lightning-stroke, and results from the clash of many hard substances.

One of the earliest notes made by primitive man must have been that chafing most objects made them warm; and curiosity alone, apart from any process of inductive reasoning, must have led him to experiment until he learned that rapid friction would produce heat sufficient for the ignition of the dust of dry wood, forming a coal that

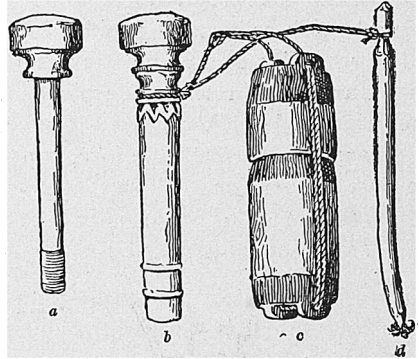


FIG. 1. A DYAK FIRE-SYRINGE

a, piston; b, cylinder and piston; c, tinder-box; d, cleaner.

might be nursed into flame. The moment this knowledge had been made practicable, a method of kindling fire at will had been invented, and civilization had taken its fundamental step in progress.

It is certain that so much was achieved in every quarter of the world long before history begins—far back below the horizon of tradition, indeed; nevertheless the earliest methods and models of apparatus survive to this day.

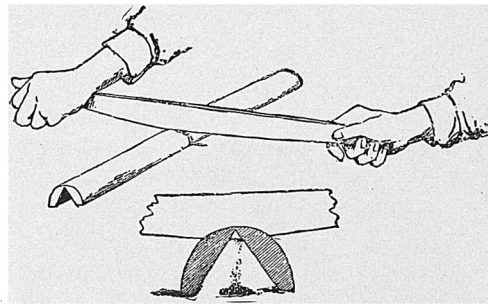


FIG. 3. FIRE-KINDLING BY SAWING A BAMBOO

The simplest means of fire-kindling is by rubbing together two sticks; but this is slow and uncertain, and suitable sticks cannot be picked up everywhere. We may therefore suppose that a very short time would elapse before each individual or group among the primitive nomads would be

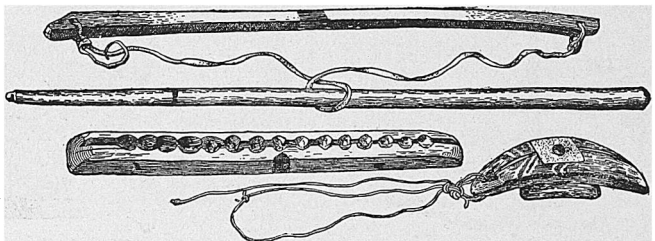


FIG. 4. AN ALASKAN FIRE-DRILL, WITH ITS MOUTH-PIECE

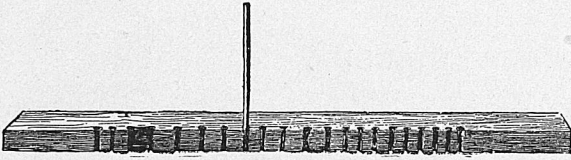


FIG. 5. A JAPANESE TEMPLE, OR "SACRED," FIRE-KINDLER

among savages may be regarded as fair types of the primitive arrangements. The simplest of these, probably, is a piece of dry soft wood upon which a pointed stick is pushed rapidly back and forth (Fig. 2). The stick is usually harder than the underpiece or "hearth," and quickly plows a groove, or enlarges one made before, until the dust pushed forward presently begins to smoke and glow (usually in less than a minute), and may be made to ignite

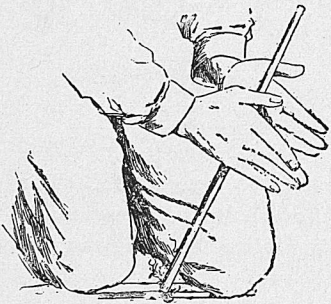


FIG. 6. TWIRLING THE FIRE-STICK

some frayed bark or other tinder easily blown into a flame. This method is confined almost entirely to the South Pacific islands and Australia, where a skillful man will thus do the work in less than a minute, with almost any chance pieces of dry wood. Another simple plan, practiced in southeastern Asia and its neighboring islands, requires a sawing movement. A bamboo is split and laid upon the ground, its hollow side down. A notch is then cut across it, and the fire-maker moves a smaller bamboo back and forth in this notch, as briskly and as heavily as possible. In a short time he has sawed partly through the lower piece and a little heap of dust has fallen below it (Fig. 3), which presently ignites under the continued friction. Various ingenious modifications of this apparatus occur among the native tribes of Burma, Malaya and Borneo; and the quality of the shining outer coat of the bamboo, which is so highly silicious that it can be made to yield a spark when struck by a piece of china, assists the process greatly.

Among the same people is found the unique fire-making implement portrayed in Fig. 1, which may as well be adverted to here, since it is confined to Malaya, although philosophically it is far ahead of any other of the primitive contrivances. It consists of a cylinder of bamboo, having a closed

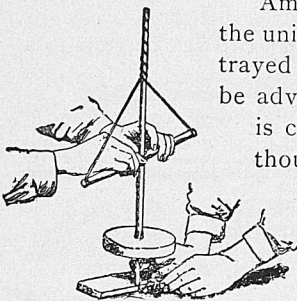


FIG. 8. A WEIGHTED BOW-DRILL

provided with a portable apparatus for this purpose; and hence speedily would arise the family fire—the hearth-stone—which is the unit of social organization.

The examples of such apparatus recently or now in use

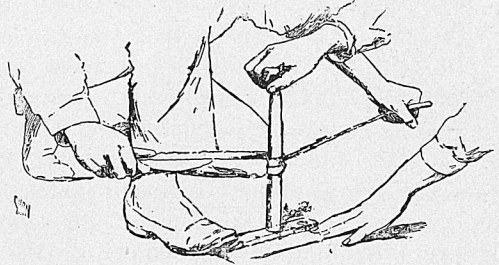


FIG. 7. ROTATING THE FIRE-STICK BY A STRAP

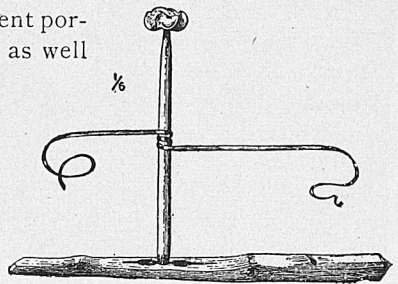


FIG. 9. AN ESKIMO FIRE-DRILL

bottom, and fitted with an air-tight piston. Whenever the Karen camper wishes to build a fire, he places a quantity of tinder in the bottom of the cylinder, sets the piston in place, and then drives it down with a sudden blow. When he drags the piston out he finds the

tinder ignited by the heat generated from the extreme compression of the air within the tube, under the force of the blow. This is a rather deep application of a law of physics for a savage. One wonders by what curious accident it was discovered; and that an ability capable of seizing upon, and making practical application of such a dis-

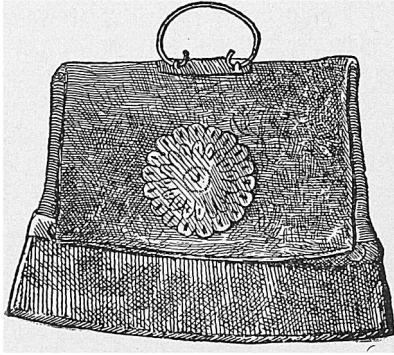


FIG. 12. A CHINESE FLINT-AND-TINDER POUCH

covery, should have borne so little fruit in other directions.

It ought here to be remarked that the people who use the means above noted (none of which, however, are known elsewhere), also obtain fire by means of the drill, and by the striking together of stones or metals, as will be described hereafter.

Next higher in grade, because more complicated, comes the rotary drilling mode of producing fire, out of which has been developed the "fire-drill," which, in one form or

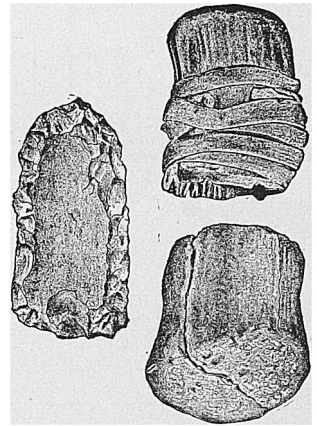


FIG. 10. ESKIMO FIRE-STONES: FLINT, IRON-PYRITES, AND THE HANDLE OF THE LATTER

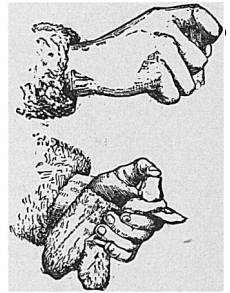


FIG. 11. STRIKING FIRE FROM FLINT AND PYRITES: EASTERN ESKIMO

another, does service in almost all parts of the world. The National Museum at Washington contains hundreds of examples, and several illustrated papers upon these and similar objects have been published by the Smithsonian Institution, especially one written by Walter Hough.

The simplest rotary method is the twirling of a stick held upright and resting upon another piece of wood, in a little socket at the side of which a notch or canal has been cut.

"There is a great knack,"

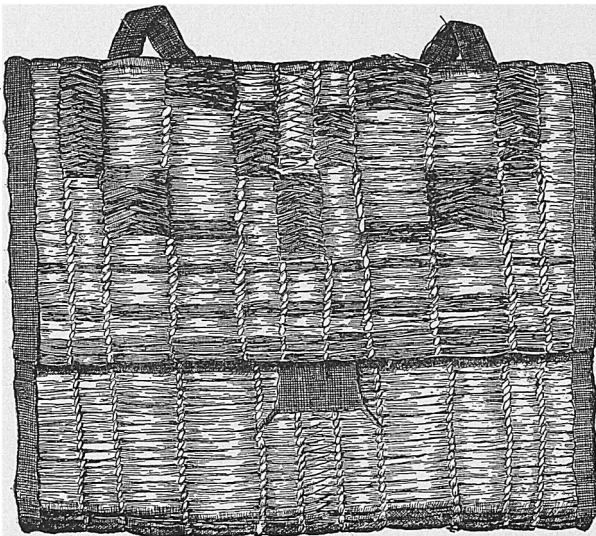


FIG. 13. A JAPANESE FLINT-AND-TINDER POUCH

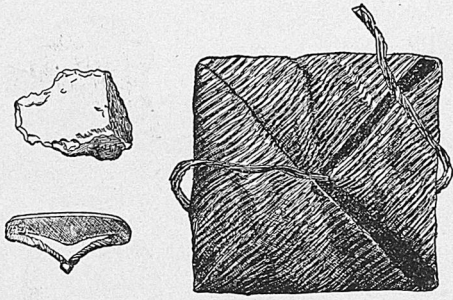


FIG. 14. A SMOKER'S STRIKE-A-LIGHT AND POUCH: JAPAN

collecting in the canal cut into the cavity from the side of the lower piece of wood. Soon, as the motion progresses, the powder begins to increase and to get darker, the odor of burning wood is noticed and the smoke is seen. Probably when the next motion ceases there will be a little curl of peculiarly colored smoke, which shows that active

combustion has begun. The pellet of ground-off wood may now be shaken out of the slot or canal. At first it is dark;

a thin line of smoke comes

from it; gradually the fire spreads through it until it glows. In this semi-charred dust the heat is held until it increases to about 450° , or



FIG. 15: JAPANESE MOUNTED FLINT AND STEEL

higher. Everything depends on keeping the dust in a heap; it is impossible to make fire without doing this. . . . It is

found that both the drill and lower piece, which, for convenience, shall be called the hearth, must be of dry, inflammable wood. Wood that is soft from incipient decay is chosen; most often pieces riddled by worms. This is the *felicis materia* spoken of by Festus as used by the Vestals. . . . Woods vary in combustibility depending on their density, coloring matter, and, perhaps, their chemical constitution. Sap-wood of juniper and soft white maple yield fire with the bow, but light mesquite is the best of all. The vascular, starchy, flowering-stems of plants have always been

says Walter Hough, "in twirling the vertical stick. It is taken between the palms of the outstretched hands (Fig. 6), which are drawn backwards and forwards past each other almost to the finger-tips, thus giving the drill a reciprocating motion. At the same time a strong downward pressure is given. If the lower part of the drill is observed when the motion begins, it will be seen that powder is ground off and is

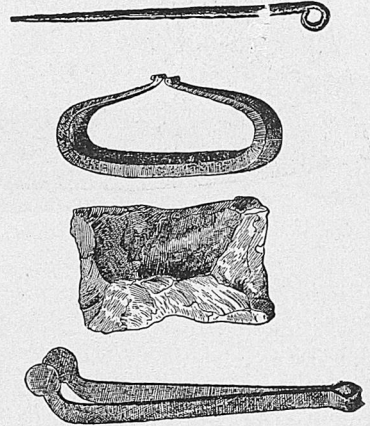


FIG. 16. KOORDISH FLINT, STEEL, AND PIPE-CLEANERS: TURKEY



FIG. 17. FLINT, STEEL, TINDER-HORN, PUNK AND POUCH: CHEYENNE INDIANS

a favorite fire-generating material."

Certain improvements and modifications of this arrangement are made, such as the charring of the hearth, the use of fine sand to increase the friction, etc.; and by simple contrivances of this kind is

yet lighted the "sacred" fire which constitutes a part of various religions. It is so done not only in the kivas of Zuñi and Tusayan, but in the Parsee temples of Persia, in India, Japan and elsewhere. This practice is based upon the consistent theory that fire is a spirit inherent in the wood, which should be brought to light in a temple only by contact with other wood, hence the Parsee priest or the Red Indian shaman would deem it a profanation to ignite his temple-fire by means of a

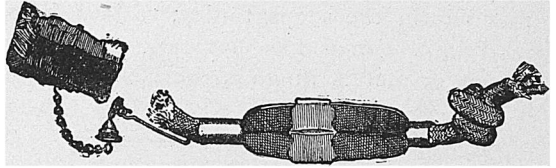


FIG. 18. A FRENCH STRIKE-A-LIGHT

match, or an electric current, or in any other than the traditional manner; and never sees that in the antiquity of the custom lies its present quality of sacredness.

Men soon improved the plan of twirling the fire-stick between their palms by taking a turn or two of a cord or strap

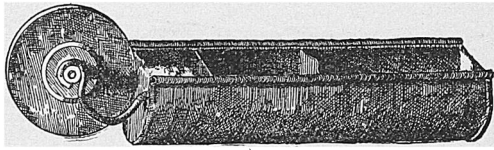


FIG. 19. A WHEEL TINDER-BOX: SCOTLAND

around it (Fig. 7), and pulling its ends rapidly back and forth, forcing a swift rotation. This required, of course, that a second person should hold the affair firmly; but any necessity for such a helper was soon overcome by fitting a bar across the top upon which a single operator might lean his weight, while holding the hearth steady with his knees. The Eskimos, however, preferred a headpiece that they could grasp with their teeth, often carved out of walrus ivory to fit the mouth, or adapted from the ankle-bone of a deer (Figs. 4, 9). The Tchuckchis, Samoyeds and other natives of arctic Asia have similar contrivances.

An advance upon this is the bow-drill (Fig. 8), precisely as employed by the civilized jeweler, and, for that matter, in use among most American

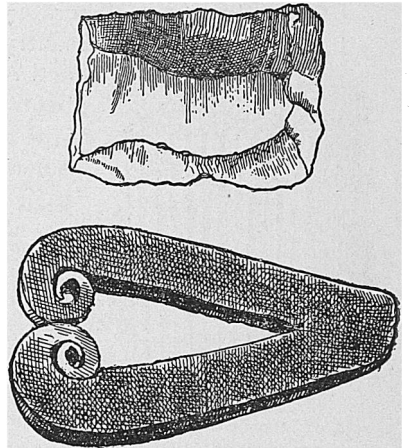


FIG. 20. A MEXICAN FLINT AND STEEL

Indians as a drill for perforating beads, and boring pipes and other articles of stone, bone, shell, etc. Often the bow is only a curved stick, or a perforated board, sliding up and down the fire-stick; but among the western Eskimos, who exhibit a marked tendency toward decoration, the bow is always of bone or ivory, carved at the ends and etched along its sides.

Throwing sparks upon tinder or punk, by striking together stones and metals, is another means widely employed; and you

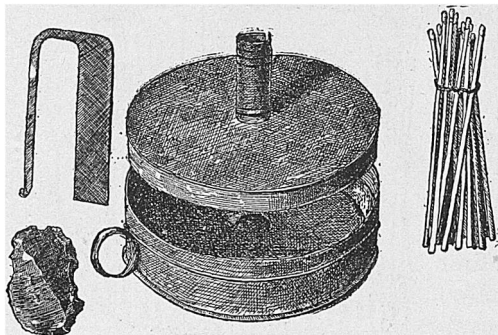


FIG. 21. AN ENGLISH TINDER-BOX AND SPUNKS

may buy in the shops to-day, various forms of flint-and-steel "strike-a-lights."

Primitive man, like many existing races, had no steel, but all have had flinty stones or metals which answered the purpose. Evidence points to a prehistoric knowledge, in various parts of the Old World, of the efficacy of iron-pyrites with flint as a means of striking fire; and the natives of Canada and northward formerly employed quartz and pyrites, or even two pieces of pyrites alone.

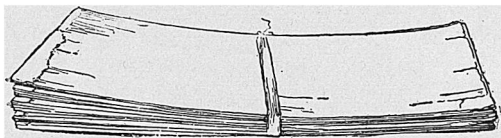


FIG. 22. JAPANESE SHAVING-MATCHES, TIPPED WITH SULFUR

In a region of snow and ice not only is some portable method of obtaining fire highly important, but it is needful to insure the dryness of all the materials. Hence all northern peoples wear a case or bag containing their fire-making tools, with a stock of prepared tinder. Such materials are pictured in Figs. 12 to 17. The smaller pouches needed for the flint-and-steel are often elaborately ornamented; and their service has survived among semi-civilized peoples, as shown in Figs. 10 to 20.

Somewhat more elaborate devices are still employed by the peasantry of Europe

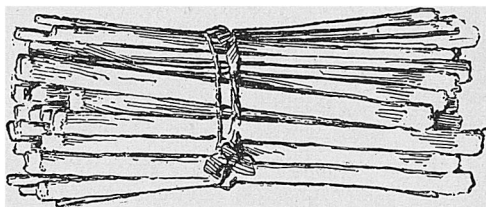


FIG. 23. SULFUR "SPUNKS": PHILADELPHIA, 1830

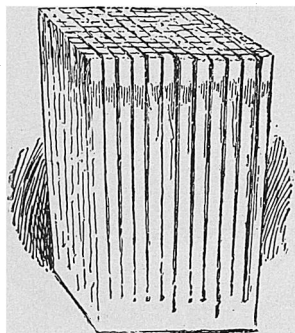


FIG. 25. A BLOCK OF EARLY LUCIFER-MATCHES

and Asia, and were the reliance of our own grandfathers before the introduction of lucifer-matches. Smokers can still provide themselves with such a convenience, combined with a slow-match (Fig. 18), enabling them to light their pipes in wet or windy weather. An odd form (Fig. 19) had a rough wheel against which the flint was pressed, the twirling of the wheel sending a shower of sparks into the tinder laid in the trough. The old English flint-and-tinder box appears in Fig. 21.

The first matches were splinters (or sometimes shavings) of wood, tipped with sulfur, which burst into flame when dipped into a bottle of phosphorus. It is scarcely fifty years since the first blocks of friction-matches (Fig. 25)

appeared, tipped with a chemical dried paste, so highly combustible that the heat generated by a simple scratch against some hard object sufficed to set them afire. Lastly, "safety" matches were made, where a necessary chemical element was supplied only by a prepared surface upon which the match was to be "struck."

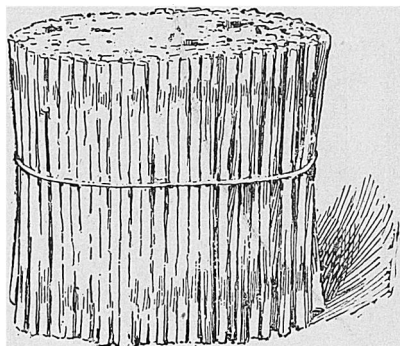


FIG. 26. SULFUR "SPUNKS": FRANCE